

Device for feeding rolled up fabrics to cutting tables severing the fabric into individual pieces

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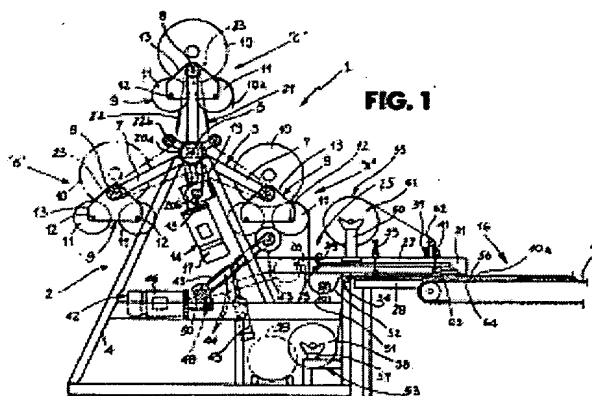
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Abstract of EP0578903

The described feeding device comprises a movable support unit (2) having at least two supporting cradles (9) each adapted to carry a fabric roll (10), a power unit (17) actuating the support unit (2) for alternately and selectively transferring each supporting cradle (9) between a first operating position ("A") in which it unwinds and rewinds the respective fabric roll (10) and at least a second operating position ("B") in which the fabric roll (10) is loaded and unloaded. A gripping and pulling unit (25) disposed intermediate the support unit (2) and the cutting table (16) gets hold of the fabric (10a) from the roll (10) maintained in the first operating position ("A") and operatively engages it on the cutting table (16).



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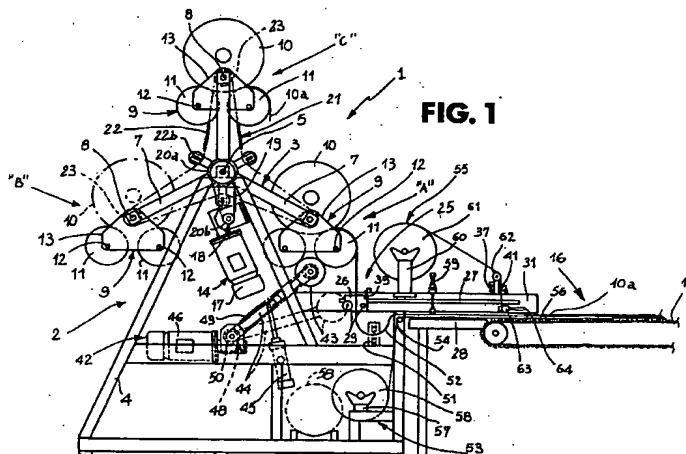
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54 **Device for feeding rolled up fabrics to cutting tables severing the fabric into individual pieces.**

57 The described feeding device comprises a movable support unit (2) having at least two supporting cradles (9) each adapted to carry a fabric roll (10), a power unit (17) actuating the support unit (2) for alternately and selectively transferring each supporting cradle (9) between a first operating position ("A") in which it unwinds and rewinds the respective fabric

roll (10) and at least a second operating position ("B") in which the fabric roll (10) is loaded and unloaded. A gripping and pulling unit (25) disposed intermediate the support unit (2) and the cutting table (16) gets hold of the fabric (10a) from the roll (10) maintained in the first operating position ("A") and operatively engages it on the cutting table (16).



The present invention relates to a device for feeding rolled up fabrics to cutting tables severing the fabric into individual layers, comprising the use of: a cutting table provided with a ribbon conveyor operable for laying a fabric thereon, which is fed from a corresponding roll rotatably supported according to its own horizontal rolling axis; first members for feeding a paper sheet to be put under the fabric unrolled onto the conveyor ribbon; and second members for feeding a film of plastic material to be put over the fabric unrolled onto the conveyor ribbon.

It is known that industrial fabric cutting is carried out by appropriate devices after positioning and laying said fabrics in superposed layers or in a single layer on a cutting table generally comprising a conveyor ribbon having supporting bristles at the top.

In particular, in machines carrying out the cutting of a single fabric layer at a time, cutting operations must be executed under vacuum. For the purpose the fabric is laid on the cutting table between a porous paper sheet, in turn in contact with the conveyor bristles under which the vacuum is created, and a film of plastic material, such as nylon or polyethylene, that is disposed over the fabric layer, thereby forming a sealing barrier capable of promoting the formation of the vacuum over and under the fabric and maintaining it.

Presently all operations for feeding fabric to the conveyor ribbon of the cutting table and arranging the paper sheet and plastics film under and over the fabric layer respectively are carried out manually.

Practically, upstream of the cutting table a positioning station for a fabric roll is provided and it comprises a support rotatably holding the roll by acting on the opposite ends of a bar previously fitted in the central roll bore. After the roll has been positioned on the support, two operators get hold of the initial fabric border, on opposite sides thereof, and by pulling it partially unwind the roll as far as a length thereof lies on the conveyor ribbon on which the initial paper portion has been laid, said paper being unrolled too from a corresponding rotatably supported roll.

Subsequently, the initial length of the plastics film is disposed on the fabric and, after an aspirator has been started for creating the vacuum, the conveyor ribbon is actuated and it simultaneously carries out unrolling of the fabric, the paper and the film which are laid on the conveyor itself according to the intended length.

The fabric length thus laid on the conveyor ribbon lends itself to be submitted to the desired cutting operation so that it is severed from the roll by a rectilinear transverse cutting action.

When the cutting operations provided for a given fabric type have been completed, the operators after rewinding the remaining terminal fabric border on the respective roll, must carry out the removal of the roll from its support and replace it with a new roll, afterwards repeating all operating steps previously described.

As a result of the foregoing, it appears that due to present requirements there is an increasing need for greater flexibility in operation. In fact, the production is increasingly more addressed to meeting orders of small amounts and differentiated from each other. It is therefore apparent that all necessary steps preparing rolls for cutting operations have greater weight than the fabric cutting in itself as they must be repeated at each roll changing and therefore very often.

In actual fact, as cutting machines are subjected to repeated stoppages, they often have an actual use rate that does not exceed 30-40%, which means that they are utilized far below their operating capacity. As a result, their purchase cost which is usually high needs a long period of time for being amortized and therefore it greatly affects the overall production costs.

Under this situation, the technical task underlying the present invention is to conceive a device for feeding rolled up fabrics to cutting tables which is capable of substantially eliminating the above drawbacks.

Within the scope of this technical task it is an important object of the invention to provide a feeding device for cutting tables capable of drastically reducing down time for feeding fabric to a cutting machine, by restricting any stoppage of the machine to strictly necessary cases.

The technical task mentioned and the object specified are substantially achieved by a device for feeding rolled up fabrics to cutting tables severing the fabric into individual layers, which is characterized in that it comprises: a movable support unit exhibiting at least two supporting cradles each arranged to carry a fabric roll according to its horizontal rolling axis; drive means for said support unit designed to alternately and selectively transfer each supporting cradle from a first operating position in which the respective roll is located close to the cutting table to at least a second operating position in which said roll is loaded and unloaded; a gripping and pulling unit operatively associated with said cutting table for transferring thereon an initial fabric border from the roll located at said first operating position; and means for unwinding and rewinding in a controlled manner the roll located at said first operating position.

A preferred embodiment of a device for feeding rolled up fabrics in accordance with the invention is given hereinafter by way of non-limiting

example, with reference to the accompanying drawings, in which:

- Fig. 1 is an elevational diagrammatic side view of the device of the invention;
- Fig. 2 is a fragmentary rear view of the device shown in Fig. 1;
- Figs. 3, 4 and 5 show following operational steps of the device in Fig. 1.

Referring to the drawings, a device for feeding rolled up fabrics in accordance with the invention has been generally identified by reference numeral 1.

It comprises a movable support unit 2 in turn comprising a main body 3 rotatably engaged to a base 4 at a support shaft 5 defining a horizontally-disposed central axis 5a (Fig. 2).

The main body 3 comprises a hub 6 keyed on the support shaft 5 with which at least two identical radially-extending arms 7 are integral at each end thereof, the two arms corresponding by pairs.

In the embodiment shown in Fig. 1 three pairs of arms 7 angularly spaced apart from each other by the same distance are provided. Rotatably connected to each of said pairs of arms 7 according to a rotation axis B parallel to the central axis 5a is a supporting cradle 9 adapted to carry a fabric roll 10 according to a respective rolling axis oriented horizontally and parallelly to the central axis 5a.

The supporting cradles are homogeneously distributed on a circumference concentric with the central axis 5a and are formed each with a pair of support rollers 11 rotatably engaged by means of support pins parallel to each other, between two support plates 13 in turn rotatably engaged between the respective arms 7 according to said rotation axis 8.

The main body 3 is driven in rotation about the central axis 5a by drive means 14 adapted to alternately and selectively transfer each supporting cradle 9 between a first operating position denoted "A", in which unwinding and rewinding of the respective roll 10 occurs and a second operating position, denoted "B", at which the roll 10 is loaded and unloaded.

In practice, the first operating position "A" is the position at which the roll 10 carried by the respective cradle 9 is located most closely to a conveyor ribbon 15 being part of a cutting table 16 of a conventional type and known per se.

The second operating position "B" is the position in which the cradle 9 is disposed symmetrically to position "A" in relation to a vertical plane passing by the central axis 5a. When in said second position, the roll 10 previously used at position "A" is unloaded and replaced by a new roll. In the embodiment shown, the transferring of roll 10 from position "B", that is the loading-unloading position, to position "A" takes place through two 125° rota-

tions in succession, while passing through an intermediate waiting position denoted "C".

The drive means 14 comprises a first power unit 17 and first driving gears 18, in turn comprising a first drive chain 19 and toothed pulleys 20a and 20b keyed on the support shaft 5 and first power unit 17, respectively.

Provision is also made for synchronization members 21 acting on the rotation axis 8 for keeping the axes of each pair of support rollers 11 constantly in alignment with a horizontal plane while the main body 3 is rotating. In other words, the synchronization members 21 prevent possible oscillations of cradles 9, thereby keeping the fabric rollers 10 resting thereon in a steady position.

The synchronization members 21 comprise a first interconnecting endless chain 22 passing over three gear wheels 22a fastened to the respective support plates 13 at the rotation axis 8 and three idler wheels 22b located close to the hub 6.

Provision is also made for a second interconnecting chain 23 (Fig. 2) connecting at least one auxiliary gear wheel 23a fastened to one of the support plates 13 at the respective rotation axis 8, to an auxiliary central wheel 23b fastened to the main body 3 at the central axis 5a.

Close to the first operating position "A" of a cradle 9, there is also a gripping and pulling unit 25 operatively associated with the cutting table 16 for transferring onto the conveyor ribbon 15 an initial border 10a of fabric from the roll 10 located at the first operating position "A".

The pulling unit 25 comprises at least one carriage 26 movable on rails 27 and extending over a sliding surface 28 contiguous with the conveyor ribbon 15.

In greater detail, a pair of carriages 26 movable on rails 27 is provided, the rails being fastened to respective lateral walls 31 disposed along the opposite sides of the sliding surface 28. Only one of said carriages is shown, the other being substantially identical.

Gripping members 29 controlled by actuating means 30 are arranged between carriages 26. A control means 32 for driving and controlling the carriage stroke is engaged to the lateral walls 31 with which the rails 27 are integral and it is designed to move the carriages between one end-of-stroke position in which said carriages are located close to the supporting cradle 9 in the first operating position "A" for engaging the fabric border 10a from the respective roller 10, and a second end-of-stroke position in which they are spaced apart from the supporting cradle 9 for depositing the fabric 10a onto the conveyor ribbon 15.

The gripping members 29 comprise a stopping roller 33 and a buffer roller 34 the ends of which are each slidable along a groove 35 formed in the

carriage 26. The buffer roller 34 is spring urged against the stopping roller 33 by spring means not shown as known per se.

The actuating means 30 for the gripping members 29 is comprised of at least one rocking lever element 36 rotatably engaged to the corresponding carriage 26 and adapted to move the buffer roller 34 away from the stopping roller 33 against the action of a first ratchet 37 engaged to the corresponding lateral wall 31 close to the second end-of-stroke point of carriage 26.

The first ratchet is of the unidirectional type, that is it counteracts the rocking lever element 36 only when the carriage 26 moves away from the first end-of-stroke point towards the conveyor ribbon 15.

A second lever element 38 is oscillatably engaged at the stopping roller 33 and it is provided with an engagement end piece 38a and an operating end piece 38b disposed at a right angle with respect to each other.

The engagement end piece 38a carries out a rocking movement between a first operating condition in which, due to its own weight, it is interposed between the stopping roller 33 and buffer roller 34 when they are moved apart from each other by the first rocking element 36, and a second operating condition in which it is not interposed between said stopping roller and buffer roller. The engagement end piece 38a is disposed in the second operating condition when the operating end piece 38b interferes with a second ratchet 39 located close to the first end-of-stroke point of carriage 26. The second ratchet of the unidirectional type too, interferes with the operating end piece 38b when the carriage 26 moves towards the second end-of-stroke point.

The control means 32 for driving and controlling carriages 26 comprises a motor 32a designed to move said carriages on rails 27 through toothed belts 32b, a photoelectric start cell 40 responsive to the presence of the fabric border 10a hanging from the stopping roller 33 at the beginning of the carriage stroke, and end-of-stroke members 41 for example consisting of a microswitch to be activated by the first rocking element 36 for causing carriages 26 to stop and reverse their movement.

It is also provided that a free wheel 47 be mounted on at least one end of the stopping roller 33, said free wheel engaging with a rack toothing 47a formed on the corresponding rail 27.

The operating engagement between the free wheel 47 and toothing 47a is such that during the return stroke of carriages 26 to the first end-of-stroke position, the stopping roller 33 will be driven in rotation clockwise with reference to the drawings, at a peripheral speed substantially identical with its displacement speed, to the ends to be clarified in

the following.

The fabric roll 10 disposed in the first operating position "A" is set in rotation either clockwise or counterclockwise by means 42 for the controlled unwinding and rewinding of the fabric roll, comprising at least one driving roller 43 operatively mounted on a framework 44 oscillatably connected to the base 4 and movable upon command of an actuator 45, between a work condition in which the driving roller 43 acts by contact on a pair of support rollers 11 carrying the cradle 9, and a rest condition in which the driving roller is moved apart from the cradle 9 in order to enable it to move to the second operating position. A second power unit 46 will transmit the rotatory motion to the driving roller 43 through second driving gears 48 comprised of a second driving chain 49 passed over second toothed pulleys 50 disposed endwise on the framework 44.

The rotational speed of the driving roller 43 and therefore the unwinding speed of the fabric from roll 10 is correlated with the forward movement speed of the conveyor ribbon 15. To this end, a control unit 51 operates close to the first end-of-stroke point of carriages 26. Said unit 51 is defined by a series of photoelectric cells controlling the operation speed of the second power unit 46 so that the width of a fabric loop 52 formed in said area during the fabric unwinding from roll 10 may be kept within predetermined limits.

Provision is also made for first members 53 for feeding a paper sheet 54 to be put under an unwound fabric, both at the sliding surface 28 and the conveyor ribbon 15, and second members 55 for feeding a film of plastic material 56 to be located over the fabric unrolled onto the conveyor ribbon 15.

The first feed members 53 comprise a first support base 57 rotatably carrying a paper roll 58 which is freely unrolled while the fabric is being moved forward, as well as elements 59 for selectively stopping the paper sheet 54 on the sliding surface 28 during the fabric rewinding step. The stopping elements 59 act at the opposite side edges of the paper sheet 54 projecting beyond the fabric selvages.

The second feed members 55 comprise a second support base 60 fastened above the sliding surface 28 and arranged to rotatably support a roll 61 of plastics film 56, which will be unrolled as well during the forward moving of the fabric. Combined with the second base 60 is a first fixed idler roller 62 and a second movable idler roller 63 inside which an appropriate suction means creates the vacuum in case of need, so as to retain the film 56 against the roller. The second idler roller 63 runs towards the conveyor ribbon 15 against the action of spring means, within elongated holes 64 formed

in the lateral walls 31 at the second end-of-stroke point of carriages 26. Therefore, carriages 26 exert pressure on the movable idler roller 63 when they come close to the second end-of-stroke point, thereby disposing the film 56 before the initial fabric border 10a.

Operation of the feeding device in accordance with the invention described above mainly as regards structure, is as follows.

A new fabric roll 10 is loaded onto the supporting cradle 9 when the latter is in the operating position denoted "B". Operators must take care to arrange the initial fabric border 10a so that it may hang down from the roll 10 at the roll portion oriented towards the pulling unit 25.

Additionally or alternatively, an automatic means not described as known per se and not of importance to the ends of the invention may be provided, which means operates at the first operating position "A" in order to arrange the fabric border 10a as above specified.

While these loading operations are being carried out, a fabric roll previously arranged and disposed on the supporting cradle located at the first position denoted "A" is automatically submitted to the operating steps involving its being fed to the conveyor ribbon 15.

These operating steps first of all comprise partial unwinding of the roll 10 due to the action of the driving roller 43. The unrolled fabric border 10a comes down as far as it is in the vicinity of the gripping members 29 located on the carriage 26 which is at the first end-of-stroke going point (Fig. 3).

The photoelectric start cell 40 detects the fabric 10a descent and sends a starting signal to carriages 26. After the carriages have moved forward a short distance, the second end piece 38b interferes with the second ratchet 39 and causes the raising of the first end piece 38a, initially interposed between the stopping roller 33 and buffer roller 34. In this way the buffer roller 34 is pressed by the spring means active thereon against the stopping roller 33 and the fabric border 10a intermediate them is clamped therebetween (Fig. 4).

Carriages 26 continue their going stroke towards the second end-of-stroke position and the driving roller 43 goes on being active on the support rollers 11 and imposes a fabric unwinding speed which is substantially identical with the carriage drive speed.

In the vicinity of the second end-of-stroke point of carriages 26 the first rocking element 36 interferes with the first ratchet 37 moving the buffer roller 34 apart from the stopping roller 33 and allowing the first end piece 38a (Fig. 5) to be set intermediate said rollers. The fabric border 10a is therefore released from the gripping members 29.

Simultaneously, carriage 26 exerts pressure on the second movable idler roller 63 on which the film is located and the end-of-stroke member 41 drives the carriage stroke reversal.

In the return stroke, the free wheel 47 imposes a clockwise rotation with reference to the drawings on the stopping roller 33, the peripheral speed of which is substantially identical with the carriage movement speed. In this way, the stopping roller 33 can slide under the fabric 10a without said fabric being pulled backward by the roller itself while moving.

The fabric 10a that has been deposited and is retained on the conveyor ribbon 15 as a result of suction produced therethrough, is pulled along over the desired length thereof and laid on the conveyor ribbon itself together with the paper sheet 54 and film 56.

During this step the driving roller 43 initially imparts an unwinding speed to the fabric 10a that is higher than the displacement speed of the conveyor ribbon 15, as far as a fabric loop 52 is formed upstream of the sliding surface 28, the amplitude of which is then kept under due control by the photoelectric cell means 51 adapted to drive the second power unit 46. Under this situation, loop 52 constitutes a substantially constant fabric supply adapted to prevent possible anomalous fabric tensioning.

When cutting operations provided in the vicinity of the conveyor ribbon 15 have been completed and the transverse cutting upstream of the utilized fabric length has been accomplished, the second power unit 46 reverses its rotation direction, thereby enabling the fabric border 10a still lying on the sliding surface 28 to be rewound. The stopping elements 59 act on the paper sheet 54 preventing it from being pulled backward, whereas the vacuum within the second idler roller 63 holds the film 56 against the roller 63 itself.

After the fluid-operated cylinder 45 has lowered the bar 44 thereby releasing the support rollers 11 from the driving roller 43, the first power unit 17 is activated and it moves the main body 3 through 120° in order to transfer the only just utilized fabric roll 10 from position "A" to position "B", while the roll at position "C" is brought to position "A". In this way a new roll 10 is ready to be fed following the above modalities, and the roll that is now at position "B" can be removed and replaced.

The invention achieves important advantages.

From the above description it appears that the device 1 in question is capable of greatly speeding up the operating steps necessary for replacing a fabric roll with another roll intended for use.

The reduction of down time in the roll replacement is particularly advantageous especially if, as normally happens when cutting tables of the above

type are used, cutting operations are carried out each time on a different fabric.

Practically, the device of the invention allows almost continuous work cycles to be executed and eliminates down time usually occurring in the known art when a fabric roll is to be replaced.

The invention is not considered limited to the example chosen for purposes of illustration, and includes all changes and modifications which do not constitute a departure from the true scope of this invention, as claimed in the following claims.

Claims

1. A device for feeding rolled up fabrics to cutting tables severing the fabric into individual layers, comprising the use of:

- a cutting table (16) provided with a ribbon conveyor (15) operable for laying a fabric (10a) thereon which is fed from a corresponding roll (10) rotatably supported according to its own horizontal winding axis;
- first members (53) for feeding a paper sheet (54) to be put under the fabric (10a) unrolled onto the conveyor ribbon (15); and
- second members (55) for feeding a film (56) of plastic material to be put over the fabric (10a) unrolled onto the conveyor ribbon (15), characterized in that it comprises:
- a movable support unit (2) exhibiting at least two supporting cradles (9) each arranged to carry a fabric roll (10) according to its horizontal winding axis;
- drive means (14) for said support unit (2), designed to alternately and selectively transfer each supporting cradle (9) from a first operating position ("A") in which the respective roll (10) is located close to the cutting table (16) to at least a second operating position ("B") in which said roll (10) is loaded and unloaded;
- a gripping and pulling unit (25) operatively associated with said cutting table (16) for transferring thereon an initial fabric border (10a) from the roll (10) located at said first operating position ("A"); and
- means (42) for unwinding and rewinding in a controlled manner the roll (10) located at said first operating position ("A").

2. A device according to claim 1, characterized in that said movable support unit (2) comprises a main body (3) rotatably engaged to a base (4)

according to a horizontally-disposed central axis (5a) and rotatably carrying the supporting cradles (9) according to respective horizontal rotation axes (8) parallel to the central axis (5a) and the roll (10) axes, said supporting cradles (9) being homogeneously distributed according to a circumference concentric with the central axis (5a).

3. A device according to claim 2, characterized in that the support unit drive means (14) comprises a first power unit (17) and first driving gears (18) adapted to bring the main body (3) in rotation about said central axis (5a) for transferring of cradles (9) between the first ("A") and second ("B") operating positions.

4. A device according to claim 2, characterized in that each supporting cradle (9) comprises a pair of support rollers (11) holding the corresponding fabric roll (10), disposed parallelly in side by side relation and rotatably engaged between a pair of support plates (13) connected to the main body (3) according to said rotation axis (8), and synchronization members (21) operating on said rotation axes (8) for keeping the axes of each pair of support rollers (11) constantly in alignment in a horizontal plane during the rotation of the main body (3).

5. A device according to claim 4, characterized in that said synchronization members (21) comprise at least one interconnecting chain (22) mutually connecting a plurality of first gear wheels (22a) fastened to the support plates (13) at said rotation axes (8).

6. A device according to claim 5, characterized in that said synchronization members (21) further comprise at least a second interconnecting chain (23) connecting at least one auxiliary gear wheel (23a) fastened to one of the support plates (13) at one of said rotation axes (8), with an auxiliary centre gear wheel (23b) fastened to the main body (3) at said central axis (5a).

7. A device according to claim 1, characterized in that said gripping and pulling unit (25) comprises:

- at least one carriage (26) movable on rails (27) running on top of a fabric sliding surface (28) disposed consecutively to the conveyor ribbon (15);
- members (29) for gripping one fabric border (10a), engaged to said carriage (26);

- actuating means (30) for operating said gripping members (29) in a controlled manner; and
 - control means (32) for moving the carriage (26) between a first end-of-stroke position in which it is located close to the supporting cradle (9) in its first operating position ("A") for engaging the fabric border (10a) from the respective roll (10), and a second end-of-stroke position in which it is moved apart from said cradle (9) for depositing the fabric (10) onto said conveyor ribbon (15).
8. A device according to claim 7, characterized in that said gripping members (29) comprise a stopping roller (33) and at least one movable buffer roller (34) spring urged against said stopping roller (33).
9. A device according to claim 8, characterized in that said actuating means (30) comprises:
- a first rocking lever element (36) arranged to move said movable buffer roller (34) apart from said stopping roller (33);
 - a first ratchet (37) arranged to interfere with the first lever element (36) in order to activate it when said carriage (26) comes in the vicinity of the second end-of-stroke point, moving away from the first end-of-stroke point;
 - a second lever element (38) provided with an operating end piece (38b) and an engagement end piece (38a) oscillating between a first operating position in which it is located intermediate said buffer roller (34) and stopping roller (33) in order to keep them spaced apart from each other, and a second operating condition in which no interposition exists between said buffer and stopping rollers and they can therefore move close to each other; and
 - a second ratchet (39) arranged to interfere with said operating end piece (38b) in the vicinity of the first end-of-stroke point of carriage (26) when said carriage moves towards the second end-of-stroke point.
10. A device according to claim 8, characterized in that at least one free gear wheel (47) is associated with said stopping roller (33), which wheel is operatively engaged to a rack toothing (47a) for driving the stopping roller (33) in rotation during the return stroke of carriage (26) from the second end-of-stroke position to

the first end-of-stroke position.

11. A device according to claim 4, characterized in that said controlled unwinding and rewinding means (42) comprises:
- at least one driving roller (43) operatively mounted to a framework (44) oscillatably connected to the base (4) and movable, upon command of an actuator (45), between a work condition in which the driving roller (43) acts by contact on the pair of supporting rollers (11) supporting the cradle (9) disposed in said first operating position ("A"), and a rest condition in which the driving roller (43) is moved apart from the cradle (9), thereby enabling it to be transferred to the second operating position ("B");
 - a second power unit (46) arranged to set the driving roller (43) in rotation through second driving gears (48); and
 - a control unit (51) interlocked to the second power unit (46) for controlling the fabric unwinding speed from said roll (10).
12. A device according to claim 7, characterized in that said first members (53) for feeding a paper sheet (54) comprise a first support base (57) rotatably carrying a paper roll (58); and
- elements (59) for selectively stopping the paper sheet (54) above said sliding surface (28).
13. A device according to claim 7, characterized in that said second feed members (55) comprise a second support base (60) rotatably carrying a plastics film roll (61) and at least one idler roller (63) disposed upstream of said cutting table and provided with suction means for holding the plastics film (56) against the roller.
14. A device according to claim 13, characterized in that said idler roller (63) is spring pressed by carriage (26) moving towards the second end-of-stroke position for depositing an initial plastics film length (56) onto the conveyor ribbon (15).

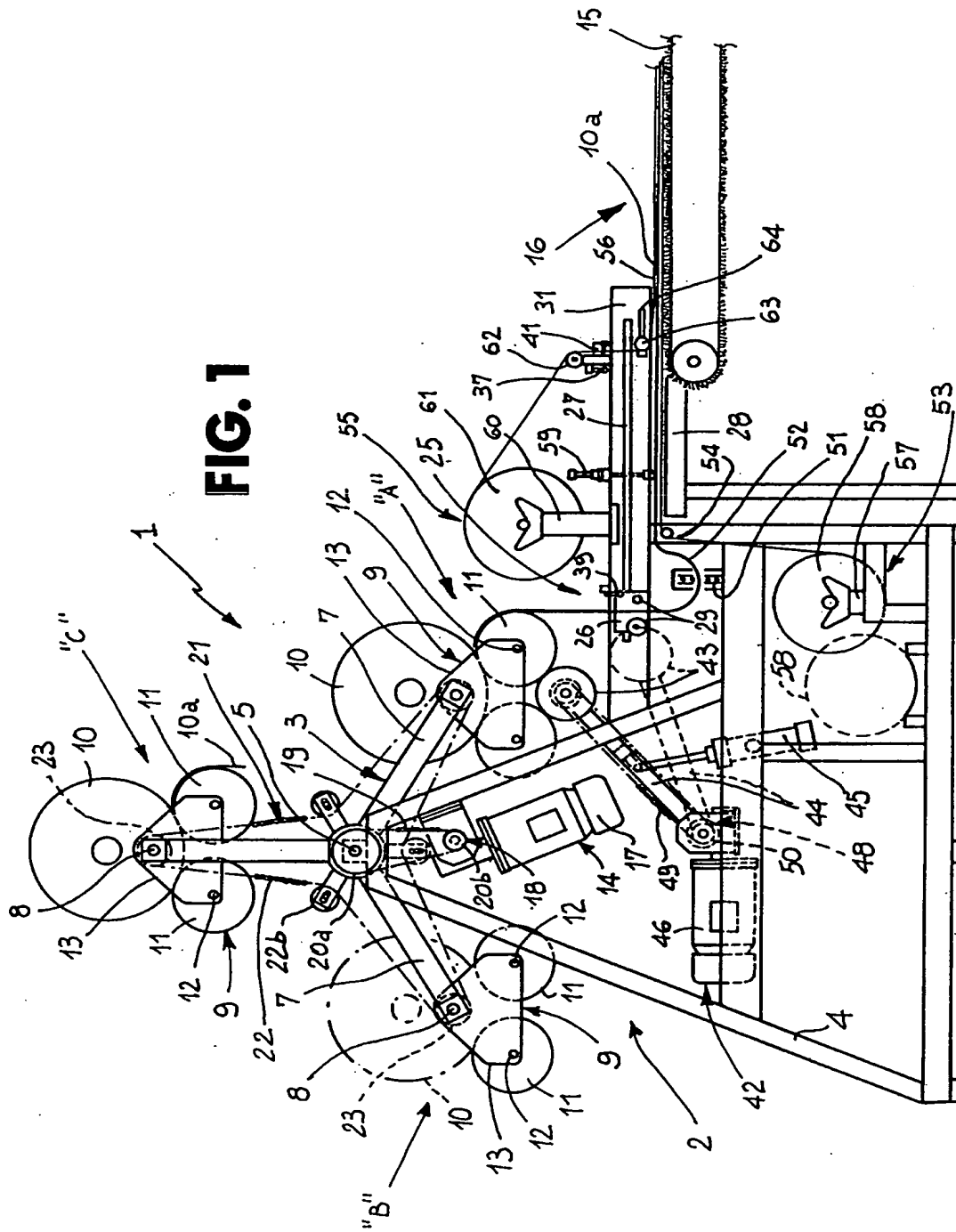


FIG. 2

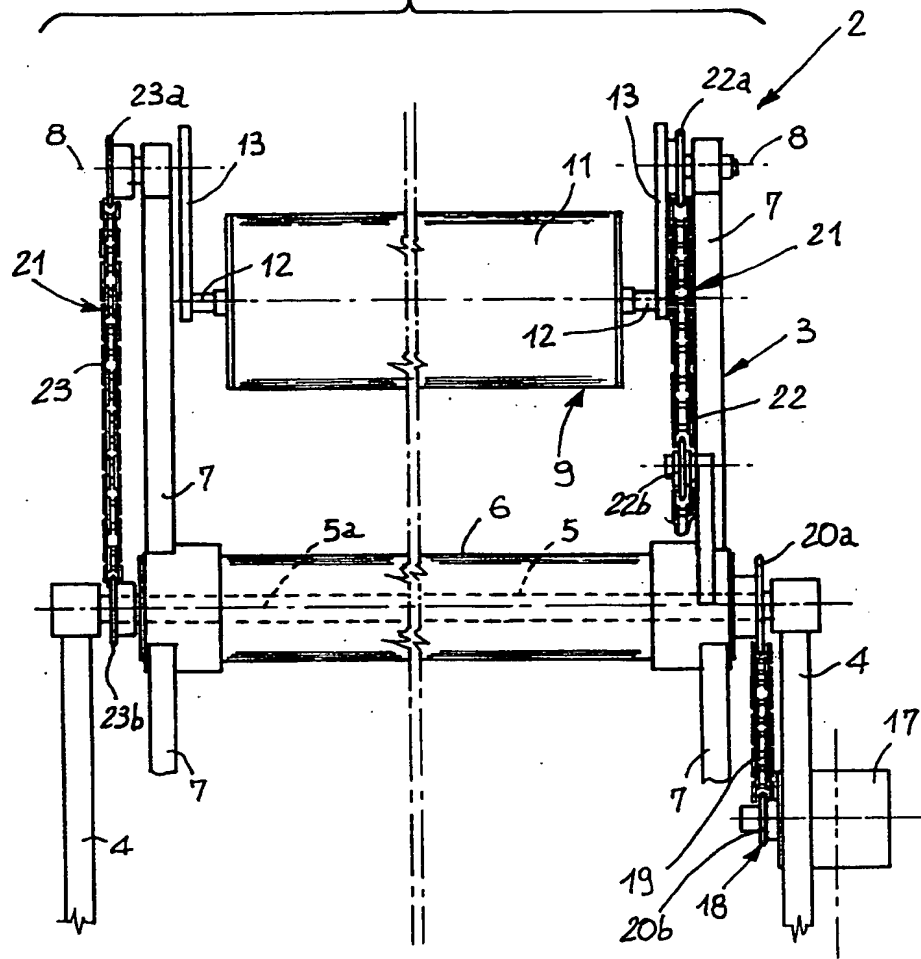
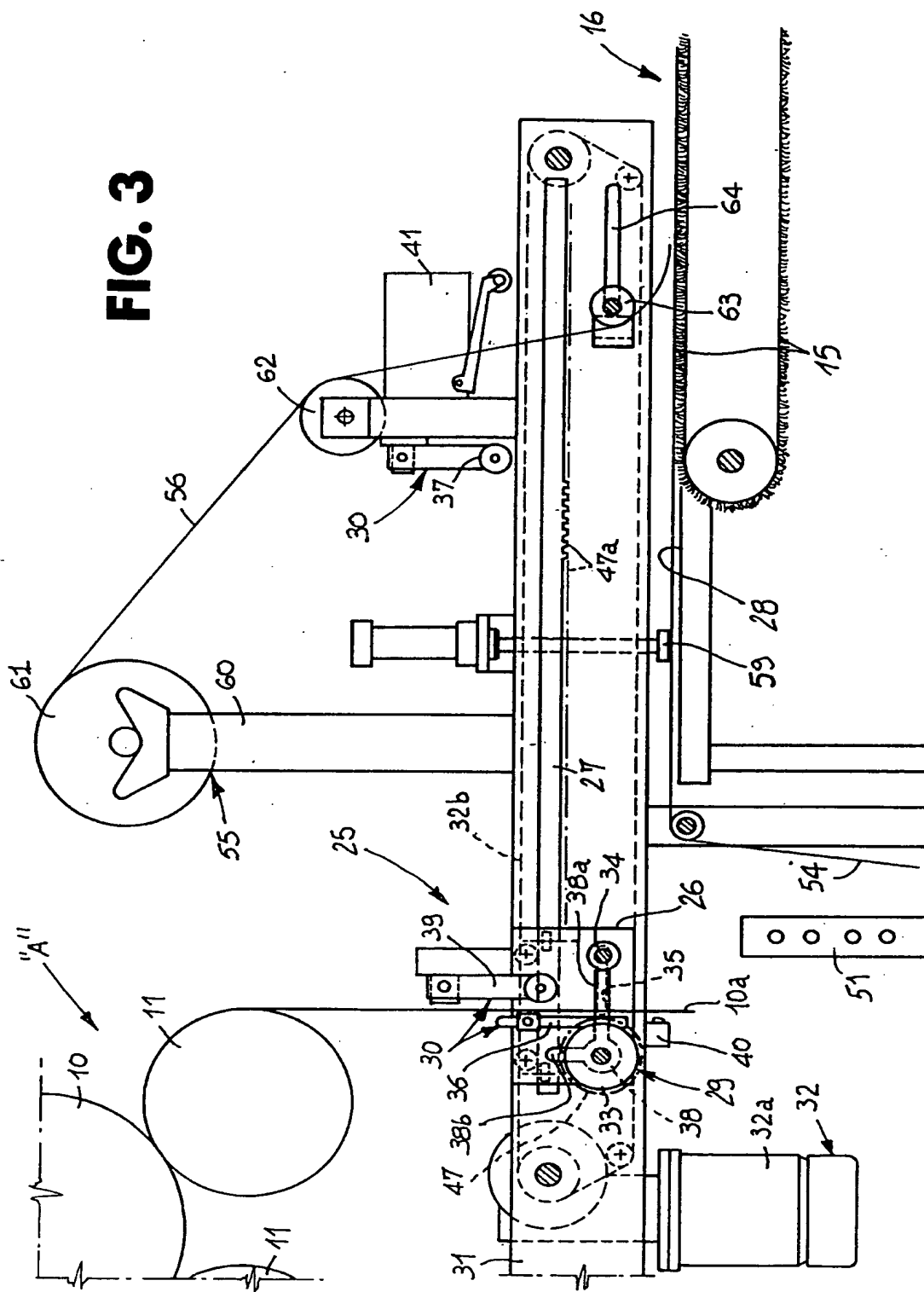


FIG. 3



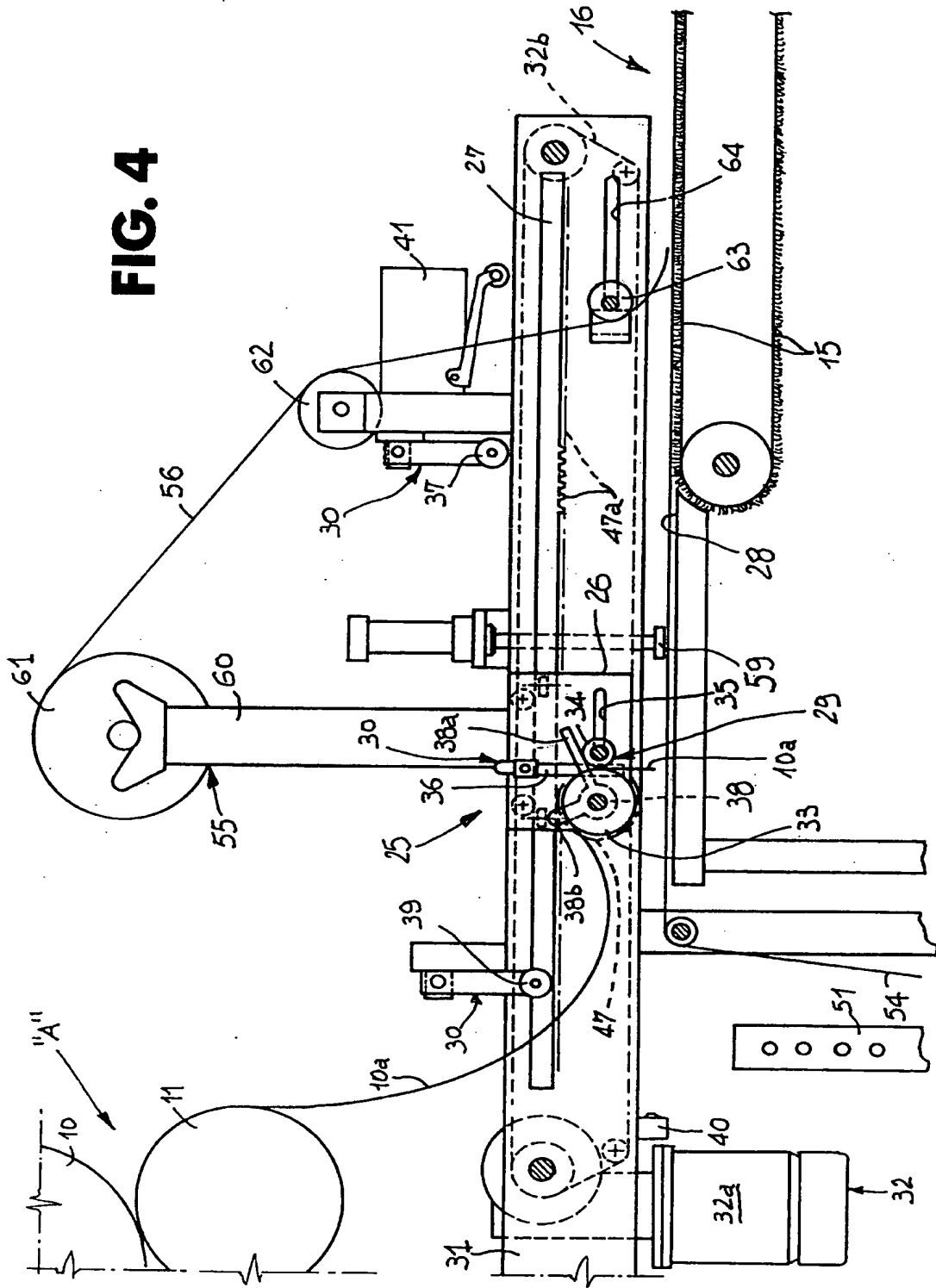
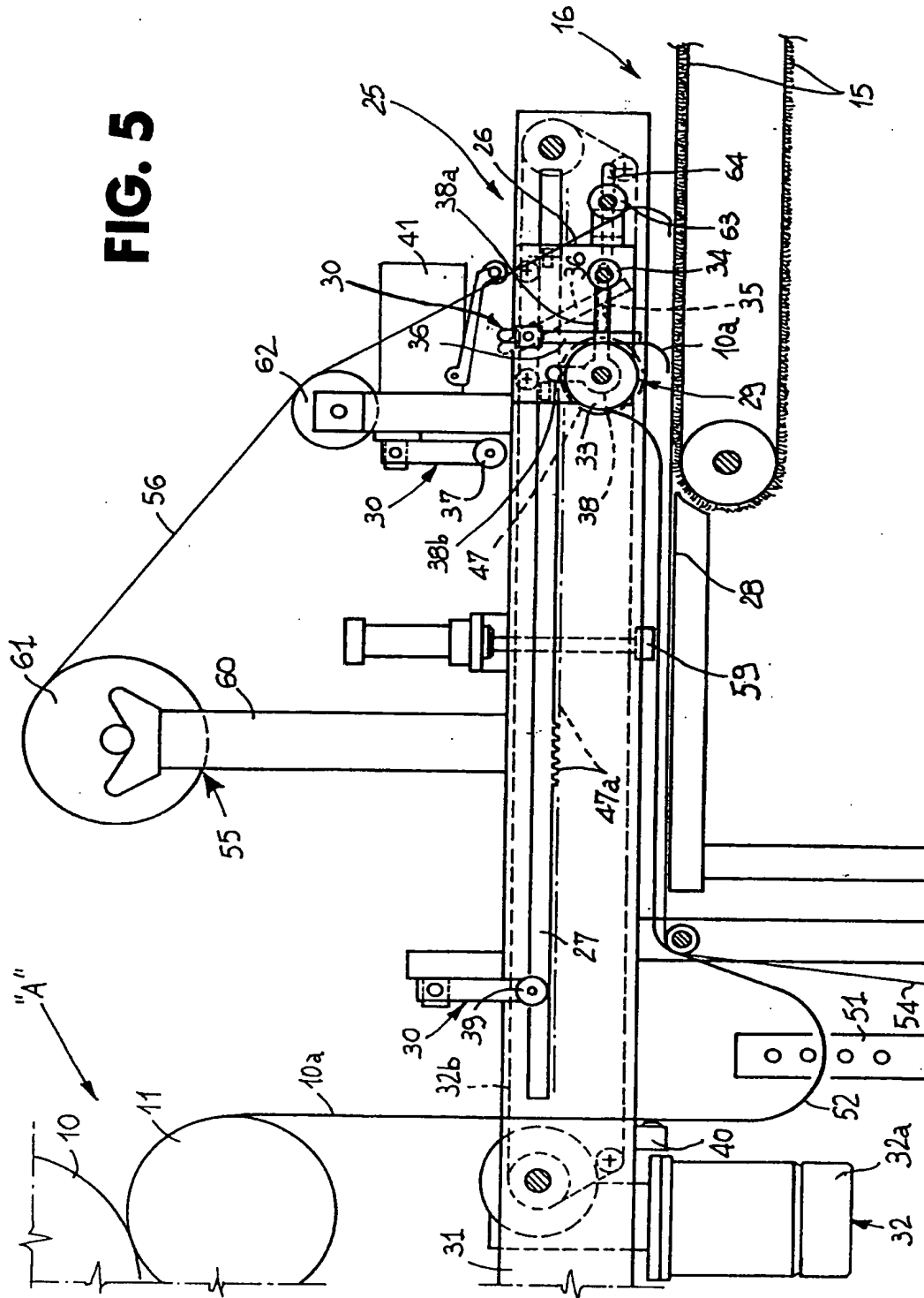


FIG. 5





European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 92 83 0601

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.5)
Y	GB-A-2 096 655 (G.O. STUMPF GMBH AND CO.) * figures 1,2,8 * * page 1, line 124 - page 2, line 80 * * page 3, line 64 - line 80 *	1	B65H16/02 B65H16/08 B65H16/10 A41H43/00 B65H20/16 B65H20/10
A	---	3,4,7,11	
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Application Number
EP 92 83 0601

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.5)
A	EP-A-0 384 914 (G. BLAIMSCHEIN) ---		
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